

Centrosaurinae

Centrosaurinae (Greek: pointed lizards) is a subfamily of ceratopsid dinosaurs, a group of large quadrupedal ornithiscians. Centrosaurinae was named by paleontologist Lawrence Lambe in 1915, with *Centrosaurus* as the type genus. The centrosaurines are further divided into three tribes: the Nasutoceratopsini, the Centrosaurini, and the Pachyrhinosaurini by Ryan *et al* (2016).^[1] Nasutoceratopsins are defined as centrosaurines closer to *Nasutoceratops titusi* than to *Centrosaurus apertus* and centrosaurins are defined as centrosaurines (more specifically eucentrosaurans) closer to *Centrosaurus apertus* than to *Pachyrhinosaurus canadensis*. The only division used up until then was Pachyrhinosaurini which was defined as centrosaurines closer to *Pachyrhinosaurus canadensis* than to *Centrosaurus apertus*. Centrosaurine fossil remains are known primarily from the northern region of Laramidia (modern day Alberta, Montana, and Alaska) but isolated taxa have been found in China and Utah as well.^[2] Defining features of centrosaurines include a large nasal horn, short supratemporal horns, and an ornamented frill projecting from the back of the skull.^[3] With the exception of *Centrosaurus apertus*, all adult centrosaurines have spike-like ornaments midway up the skull.^[4] Morphometric analysis shows that centrosaurines differ from other ceratopsian groups in skull, snout, and frill shapes.^[5] There is evidence to suggest that male centrosaurines had an extended period of adolescence and sexual ornamentation did not appear until adulthood.^[3]

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Classification

The cladogram presented here follows a 2016 phylogenetic analysis by Rivera-Sylva *et al.*.^[6]

Centrosaurines

Temporal range: Late Cretaceous, 80.8–66 Ma

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Centrosaurus "nasicornus" skeleton, Palaeontological Museum Munich

Scientific classification 

Kingdom:

Animalia

Phylum:

Chordata

Clade:

Dinosauria

Order:

†Ornithischia

Family:

†Ceratopsidae

Subfamily:

†Centrosaurinae

Lambe, 1915

Type species

†Centrosaurus apertus

Lambe, 1904

Subgroups

▪

†Albertaceratops

▪

†Brachyceratops?

▪

†Diabloceratops

▪

†Machairoceratops

▪

†Monoclonius

▪

†Medusaceratops

▪

†Sinoceratops

▪

†Wendiceratops

▪

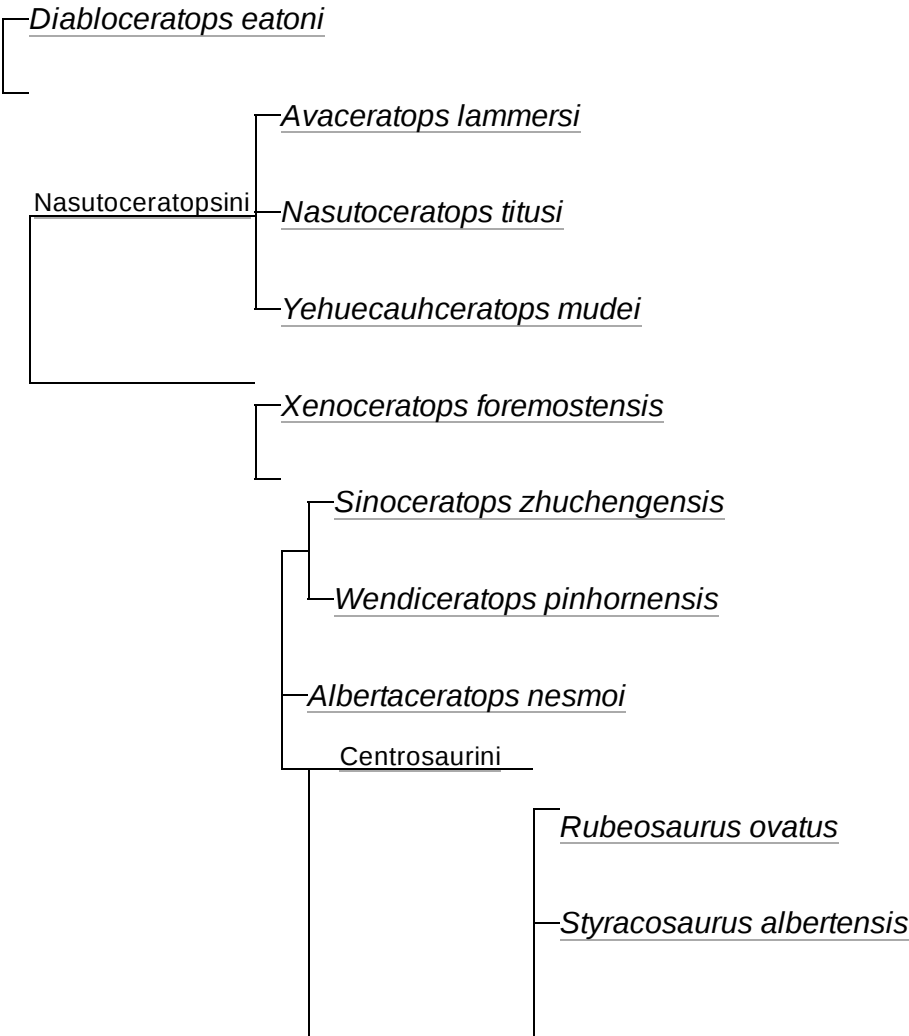
†Xenoceratops

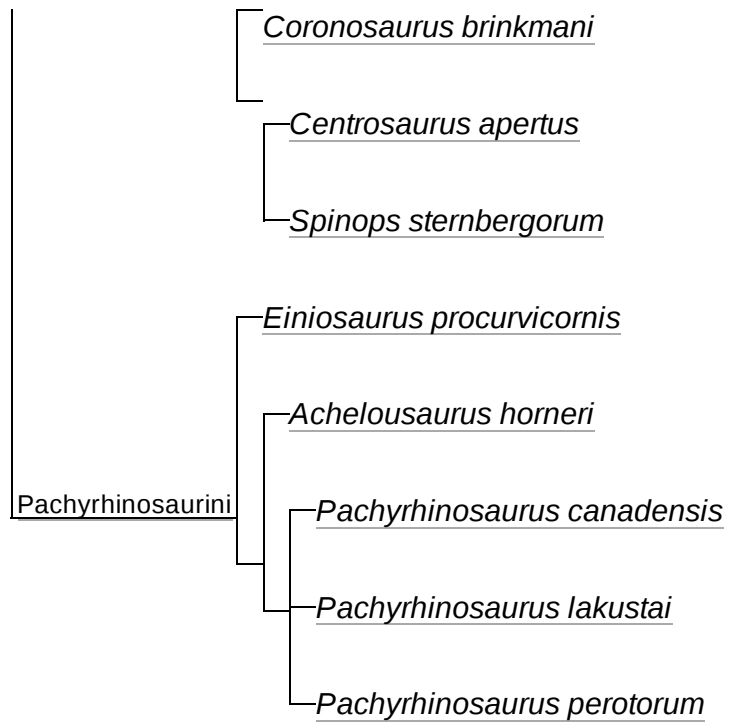
▪

†Nasutoceratopsini

| <ul style="list-style-type: none"> ▪ †<i>Avaceratops</i> ▪ †<i>Crittendenceratops</i> ▪ †<i>Nasutoceratops</i> ▪ †<i>Yhuecauhceratops</i> ▪ †Eucentrosaura <ul style="list-style-type: none"> ▪ †Centrosaurini <ul style="list-style-type: none"> ▪ †<i>Centrosaurus</i> ▪ †<i>Coronosaurus</i> ▪ †<i>Rubeosaurus?</i> ▪ †<i>Spinops</i> ▪ †<i>Styracosaurus?</i> ▪ †Pachyrhinosaurini |
|--|
| Synonyms |
| <ul style="list-style-type: none"> ▪ Pachyrhinosaurinae Sternberg, 1950 ▪ Monocloniinae Nopcsa, 1923 |

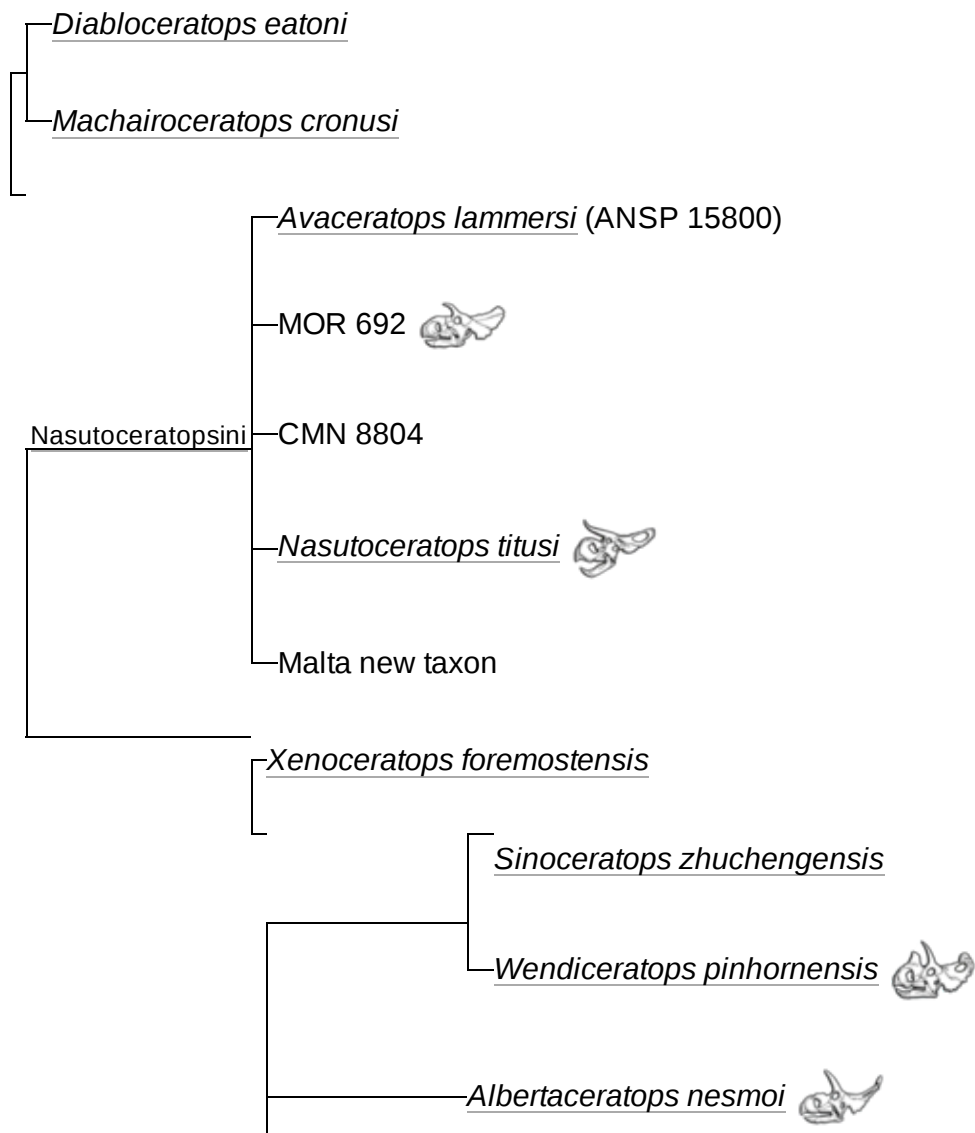
Centrosaurinae

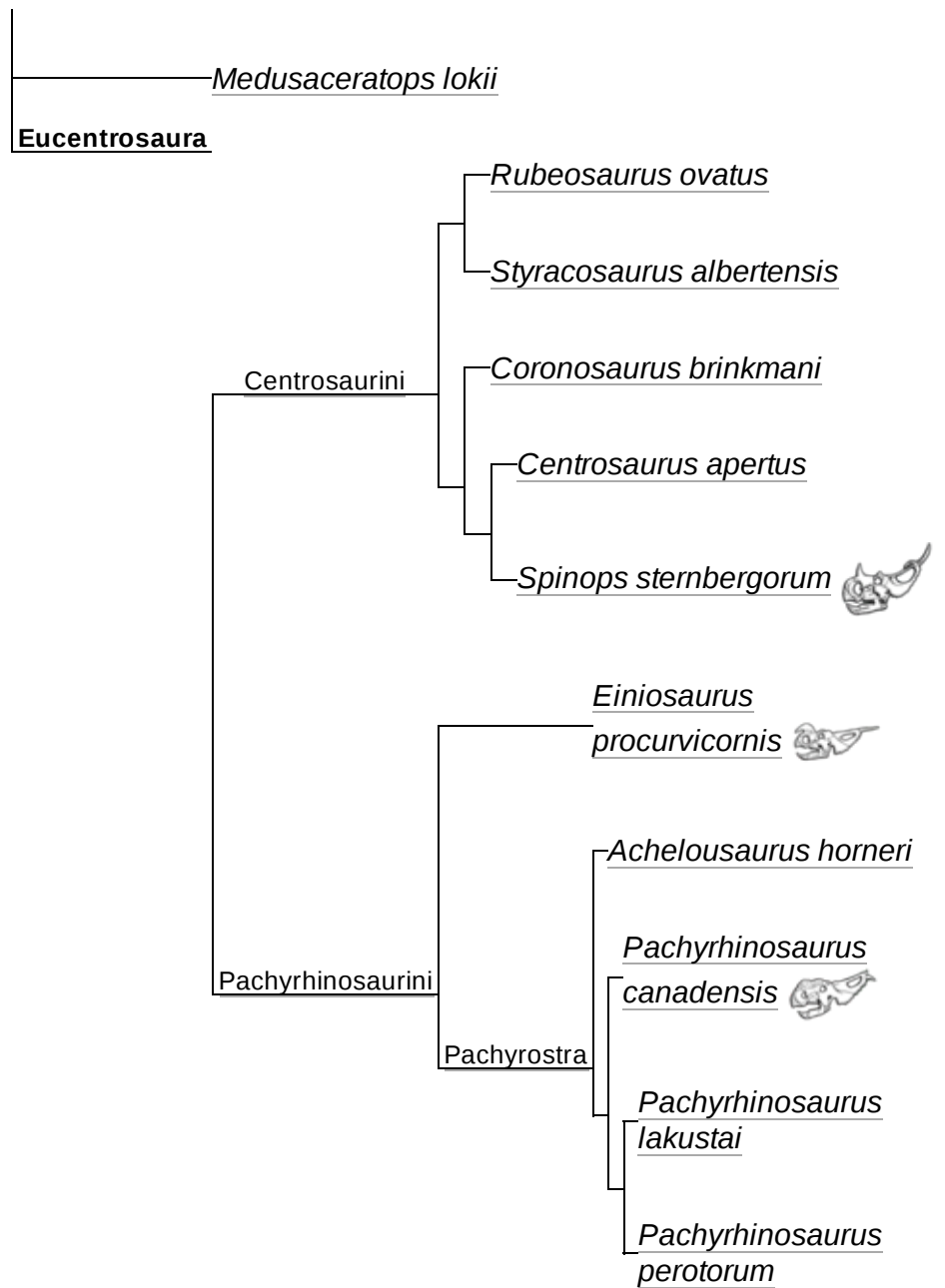




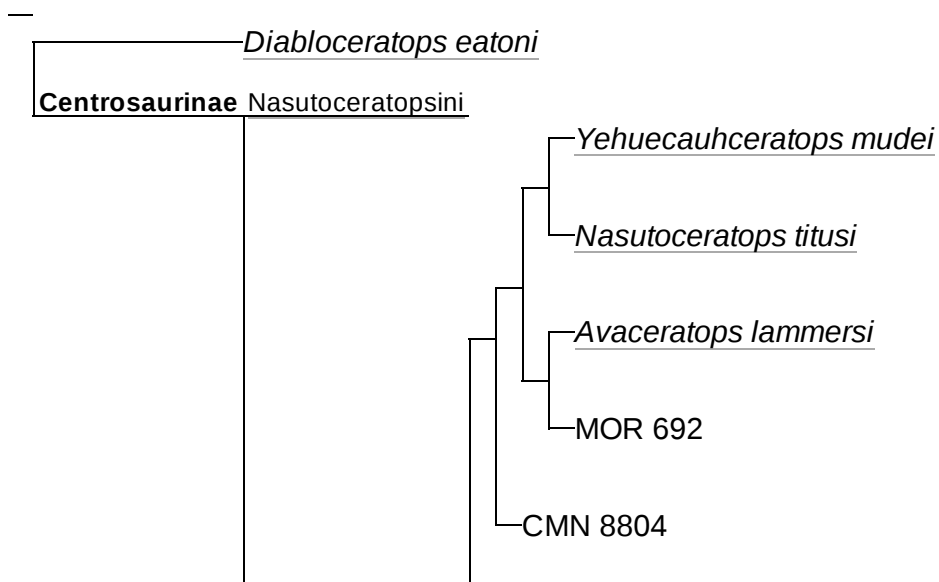
The cladogram presented below follows a phylogenetic analysis by Chiba *et al.* (2017):^[7]

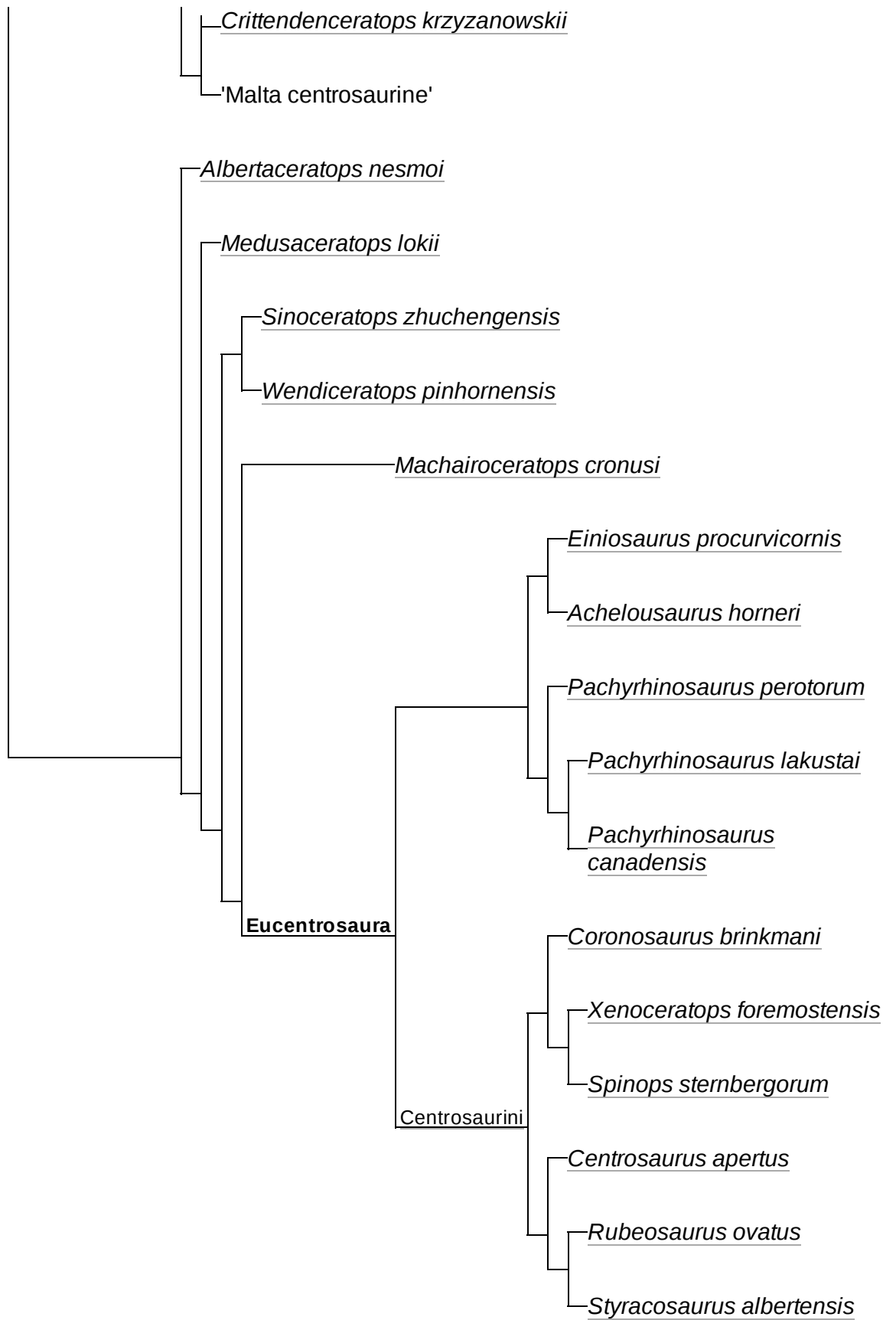
Centrosaurinae



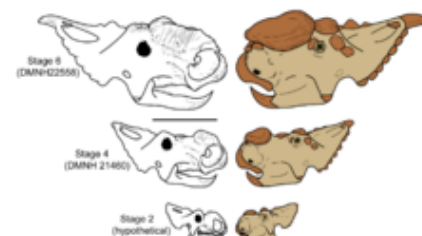


The cladogram presented here represents the conclusions of Dalman *et al.* (2018).^[8]





Possible neonate sized centrosaurine fossils have been documented in the scientific literature.^[12] Research indicates that centrosaurines did not achieve fully developed mating signals until nearly fully grown.^{[13][3]} Scott D. Sampson finds commonality between the slow growth of mating signals in centrosaurines and the extended adolescence of animals whose social structures are ranked hierarchies founded on age-related differences.^[13] In these sorts of groups young males are typically sexually mature for several years before actually beginning to breed, when their mating signals are most fully developed.^[14] Females, by contrast do not have such an extended adolescence.^[14]



Hypothesised ontogenetic development of *Pachyrhinosaurus perotorum*

See also

- Timeline of ceratopsian research

Footnotes

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12. "Abstract," Tanke and Brett-Surman (2001). Page 207.
13. "Retarded Growth of Mating Signals," Sampson (2001); page 270.
14. "Sociological Correlates in Extant Vertebrates," Sampson (2001); page 265.

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